

## TECHNICAL NOTE PP 750-TN-05

### BUTT FUSION JOINING PROCEDURES

For DriscoPlex<sup>®</sup> Municipal/Industrial/Energy Piping Products

This bulletin has been developed to assist those responsible to for the Butt-Fusion joining of Performance Pipe products in Municipal, Industrial and Energy applications. For more specific fusion information; safety requirements, saddle (sidewall) fusion procedures, socket fusion procedures and Federal regulations for gas pipe joining, please refer to Performance Pipe Bulletin PP 750, "Heat Fusion Joining Procedures and Qualification Guide."

These procedures are in alignment with Plastic Pipe Institute's (PPI) TR-33 Generic Butt Fusion Joining Procedures.

#### OVERVIEW

In heat fusion joining, mating surfaces are prepared by cleaning and facing, simultaneously melted with a hot-plate heater, the heater is removed, and the melted surfaces are pressed together and held under pressure. As the molten materials cool, they mix and fuse into a permanent, monolithic joint.

#### SET-UP PARAMETERS

**HEATING TOOL SURFACE TEMPERATURE — MINIMUM 400°F – MAXIMUM 450°F (204 – 232°C)**

Heating tool surfaces must be up to the specified temperature before you begin. All points on both heating tool surfaces where the surfaces will contact the pipe must be within the prescribed minimum and maximum temperatures. Heating tool surfaces must be clean.

**INTERFACE PRESSURE — minimum 60 psi – maximum 90 psi (414 – 621 kPa; 4.14 – 6.21 bar)**

Interface pressure is used to calculate a fusion joining pressure value for hydraulic butt fusion machines or manual machines equipped with a torque wrench. For hydraulic machines, the interface pressure, the fusion surface area, the machine's carriage cylinder size and internal drag pressure, and if necessary, the pressure needed to overcome external drag resistance, are used to calculate hydraulic fusion joining pressure gauge settings. The equipment manufacturer's instructions are used to calculate this value. ***Interface pressure and fusion machine hydraulic fusion joining pressure gauge settings are not the same!***

#### PROCEDURE

1. **Secure.** Clean the inside and outside of the component (pipe or fitting) ends by wiping with a clean, dry, lint-free cloth or paper towel. Align the component ends in the machine. ***Do not force pipes into alignment against open fusion machine clamps.*** Component ends should protrude past the clamps enough so that facing will be complete. Bring the ends together and check high-low alignment. Adjust alignment as necessary by tightening the high side down. Make sure clamps are properly secured to prevent slippage of the component ends.

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2. **Face.** Place the facing tool between the component ends, and face them to establish smooth, clean, parallel mating surfaces. If stops are present, face down to the stops. Remove all shavings from pipe ends after facing. **Do not touch the component ends with your hands after facing.**
3. **Align.** Bring the component ends together, check alignment and check for slippage against fusion pressure. Look for complete contact all around both ends with no detectable gaps, and outside diameters in high-low alignment.
4. **Melt.** Verify that the heating tool is maintaining the correct temperature. Place the heating tool between the component ends, and move the ends against the heating tool. The initial contact should be under moderate pressure to ensure full contact. Hold the ends against the heating tool **without force.**

Beads of melted polyethylene will form against the heating tool at the component ends. When the proper melt bead size is formed, quickly separate the ends, and remove the heating tool.

**Table 1 Approximate Melt Bead Size**

Pipe Size	Approximate Melt Bead Size
2" -4"	1/8" - 3/16"
4" -12"	3/16" - 1/4"
12" -24"	1/4" - 7/16"
24" -54"	7/16" - 9/16"

5. **Join.** Immediately after heating tool removal, **QUICKLY** inspect the melted ends, then bring the ends together applying the correct joining force, using 60-90psi interfacial pressure. **Do not slam.** The correct joining force will form a double bead that is rolled over to the surface on both ends.
6. **Hold.** Hold joining force against the ends until the joint is cool. The joint is cool enough for **GENTLE** handling when the double bead is cool to the touch. Cool for about 30-90 seconds per inch of pipe diameter.
  - Heavier wall thickness pipes may require longer cooling times.
7. **Inspect.** On both sides, the double bead should be rolled over to the surface, and be uniformly rounded and consistent in size all around the joint.

It is a common practice and accepted industry "Rule of Thumb" when fusing pipes of unlike DR's, to fuse a maximum mismatch of one SDR. For example, this would allow fusion of DR 11 pipe to DR 9 or DR-11 to DR 13.5. A successful fusion may be accomplished without the need of any change in the actual fusion procedure.

Per ASTM, Standard Dimension Ratio, SDR, value is when the outside diameter divided by the minimum wall thickness equals one of the following values:

5.0	6.0	7.0	9.0	11.0	13.5	17	21.0	26.0	32.5
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The terms DR and SDR are often used interchangeably.

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